UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.   : 6,856,581 B1
DATED   : February 15, 2005
INVENTOR(S) : Berstis et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,
Item [57], **ABSTRACT**, delete and insert therefor

A simple electronic horological device, termed a time cell, is presented with associated methods, systems, and computer program products. A time cell has an insulated, charge storage element that receives an electrostatic charge through its insulating medium, i.e. it is programmed. Over time, the charge storage element then loses the electrostatic charge through its insulating medium. Given the reduction of the electric potential of the programmed charge storage element at a substantially known discharge rate, and by observing the electric potential of the programmed charge storage element at a given point in time, an elapsed time period can be determined. Thus, the time cell is able to measure an elapsed time period without a continuous power source. One type of time cell is a binary time cell that may have a form similar to a non-volatile memory cell. At a given point in time after the binary time cell has been programmed, a read operation allows a binary determination as to whether or not a particular time period has elapsed by observing two possible states of the time cell: the time cell has retained enough charge such that the time cell appears to be a programmed time cell; or the time cell has been discharged during the elapsed time period such that the time cell appears to be a non-programmed time cell. A time cell can be designed and/ or programmed to select the particular time period to be measured.

Column 1,
Lines 9-19, delete and insert therefor

The present application is related to the following applications: Application Serial Number 09/703,335, filed 10/31/2000, titled "Batteryless, Oscillatorless, Analog Time Cell Usable as an Horological Device with Associated Programming Methods and Devices"; Application Serial Number 09/703,340, filed 10/31/2000, titled "Sensing Methods and Devices for a Batteryless, Oscillatorless, Binary Time Cell Usable as an Horological Device"; and Application Serial Number 09/703,334, filed 10/31/2000, titled "Sensing Methods and Devices for a Batteryless, Oscillatorless, Analog Time Cell Usable as an Horological Device".

Column 40, line 41 - Column 41, line 26,
Delete claims 1-7 and insert therefor

1. An horological device comprising:
   a time cell, wherein the time cell has a substantially discharged state before a programming operation and has a controlled discharge state after the programming operation, and wherein the time cell transitions after the programming operation from the controlled discharge state to the substantially discharged state within a predetermined time period after the programming operation; and
   a conductive lead connected to the time cell to allow reading a state of the time cell.

2. The horological device of claim 1 wherein a length of the predetermined time period varies with an initial condition of the time cell after the programming operation.

3. The horological device of claim 1 further comprising:
   an array of time cells.

4. The horological device of claim 3 wherein at least one time cell in the array of time cells has a predetermined time period that differs from a predetermined time period of another time cell in the array of time cells.

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Column 40, line 41 - Column 41, line 26 (cont'd),

5. The horological device of claim 3 wherein at least two time cells in the array of time cells have substantially identical predetermined time periods.

6. The horological device of claim 3 further comprising:
a time cell interface unit for controlling the array of time cells by initializing one or more time cells in the array of time cells.

7. The horological device of claim 3 further comprising:
a programming request processing unit for processing a programming request to set one or more time cells within the array of time cells.--

Column 41,
Lines 27-42, delete claim 8-12 and insert therefor

8. A method for using an horological device, the method comprising:
programming a time cell, wherein the time cell has a substantially discharged state before a programming operation and has a controlled discharge state after the programming operation; and
discharging the time cell, wherein the time cell transitions after the programming operation from the controlled discharge state to the substantially discharged state within a predetermined time period after the programming operation.

9. The method of claim 8 wherein a length of the predetermined time period varies with an initial condition of the time cell after the programming operation.

10. The method of claim 8 further comprising:
programming at least one time cell in an array of time cells.

11. The method of claim 10 further comprising:
controlling the array of time cells through a time cell interface unit by initializing one or more time cells in the array of time cells.

12. The method of claim 10 further comprising:
processing a programming request to set one or more time cells within the array of time cells.

Column 41, line 44 - Column 42, line 14,
Delete claim 13-17 and insert therefor

13. A computer program product on a computer readable medium for use in a data processing system for using an horological device, the computer program product comprising:
instructions for receiving a programming request to initialize the horological device; and
instructions for programming a time cell, wherein the time cell has a substantially discharged state before a programming operation and has a controlled discharge state after the programming operation, and wherein the memory cell transitions after the programming operation from the controlled discharge state to the substantially discharged state within a predetermined time period after the programming operation.

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Column 41, line 44 - Column 42, line 14 (cont'd),

14. The computer program product of claim 13 wherein a length of the predetermined time period varies with an initial condition of the time cell after the programming operation.

15. The computer program product of claim 13 further comprising:
   instructions for programming at least one time cell in an array of time cells.

16. The computer program product of claim 15 further comprising:
   instructions for controlling the array of time cells through a time cell interface unit by initializing or reading one or more time cells in the array of time cells.

17. The computer program product of claim 15 further comprising:
   instructions for processing a programming request to set one or more time cells within the array of time cells.--

Column 42,
Lines 15-25, delete claims 18-20 and insert therefor

18. An horological device comprising:
   a first mode of operation in which a memory cell has a stable memory state before a programming operation;
   a second mode of operation in which the memory cell is programmed to transition from the stable memory state to a non-stable memory state;
   a third mode of operation in which the memory cell has a non-stable memory state after the second mode of operation;
   a fourth mode of operation in which the memory cell transitions from the non-stable memory state to the stable memory state within a predetermined time period; and
   a fifth mode of operation in which the memory cell has a stable memory state after the predetermined time period.

19. The horological device of claim 18 wherein a length of the predetermined time period varies with an initial condition of the memory cell after the second mode of operation.

20. An horological device comprising:
   maintaining means for maintaining a non-time-measuring state in the horological device without inputting energy into the horological device;
   changing means for changing from the non-time-measuring state to a time-measuring state by receiving and storing an electrostatic charge in a charge storage element within the horological device, wherein the charge storage element comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium that substantially surrounds the internal medium; and
   transitioning means for transitioning from the time-measuring state to the non-time-measuring state, without inputting energy into the horological device, by discharging the stored electrostatic charge in the charge storage element to a predetermined level of electrical potential within a predetermined time period after changing to the time-measuring state.--

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Column 42,
Lines 26-33, delete claims 21-22 and insert therefor

21. A method for using an horological device, the method comprising:
    maintaining a non-time-measuring state in the horological device without inputting energy into the horological device;
    changing from the non-time-measuring state to a time-measuring state by receiving and storing an electrostatic charge in a charge storage element within the horological device, wherein the charge storage element comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium that substantially surrounds the internal medium;
    transitioning from the time-measuring state to the non-time-measuring state, without inputting energy into the horological device, by discharging the stored electrostatic charge in the charge storage element to a predetermined level of electrical potential within a predetermined time period after changing to the time-measuring state; and
    detecting a current state of the charge storage element to determine an elapsed time.

22. An horological device comprising:
    an internal medium for storing an electrostatic charge;
    an insulating medium for insulating the internal medium, the internal medium and the insulating medium forming a charge storage element,
        wherein the insulating medium substantially surrounds the internal medium;
        wherein the insulating medium has physical properties that allow a charging process for charging the internal medium with an electrostatic charge through the insulating medium;
        wherein the insulating medium has physical properties that allow a discharge process for discharging a stored electrostatic charge from the internal medium through the insulating medium;
        wherein the insulating medium has one or more physical properties that affect a rate of discharge in the discharge process; and
        wherein at least one physical property of the insulating medium has been selected so that the discharge process discharges a stored electrostatic charge at a predetermined discharge rate.--

Column 42, line 34 - Column 43, line 48,

23. The horological device of claim 22 wherein the predetermined discharge rate is non-linear with respect to time.

24. The horological device of claim 22 wherein the discharge process is Fowler-Nordheim tunneling.

25. The horological device of claim 22 wherein the charging process is channel hot electron injection.

26. The horological device of claim 22 further comprising:
    a charge injector for injecting charge through the insulating medium into the internal medium.

27. The horological device of claim 26 further comprising:
    a programming unit for programming the charge storage element by operating the charge injector.

28. The horological device of claim 27 further comprising:
    a request processing unit for processing requests to program the charge storage element.

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Column 42, line 34 - Column 43, line 48 (cont'd),

29. The horological device of claim 27 further comprising:
     a status generating unit for generating status from programming the charge storage element.

30. The horological device of claim 22 wherein the charge storage element is a floating gate in a floating gate field effect transistor.—

Column 43, line 51 - Column 44, line 32,
Delete claims 31-38 and insert therefor

31. A method for using an horological device, the method comprising:
     programming a charge storage element by storing an electrostatic charge within the charge storage element, wherein the charge storage element comprises an internal medium for storing an electrostatic charge and an insulating medium for insulating the internal medium,
          wherein the insulating medium substantially surrounds the internal medium;
          wherein the insulating medium has physical properties that allow a charging process for charging the internal medium with an electrostatic charge through the insulating medium;
          wherein the insulating medium has physical properties that allow a discharge process for discharging a stored electrostatic charge from the internal medium through the insulating medium;
          wherein the insulating medium has one or more physical properties that affect a rate of discharge in the discharge process; and
          wherein at least one physical property of the insulating medium has been selected so that the discharge process discharges a stored electrostatic charge at a predetermined rate; and
          discharging the stored electrostatic charge from the charge storage element.

32. The method of claim 31 further comprising:
     programming the charge storage element by injecting charge through the insulating medium into the internal medium.

33. The method of claim 31 further comprising:
     processing requests to program the charge storage element.

34. The method of claim 31 further comprising:
     generating status after attempting to program the charge storage element.

35. The method of claim 31 wherein the charge storage element is a floating gate in a floating gate field effect transistor.—

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Column 44,
Lines 33-51, delete claims 36-40 and insert therefor

36. An article of manufacture comprising:
    a binary time cell; and
    a conductive lead for allowing a state of the binary time cell to be modified or read.

37. The article of manufacture of claim 36 wherein the binary time cell has a substantially discharged state before a programming operation and has a controlled discharge state after the programming operation, and wherein the binary time cell transitions after the programming operation from the controlled discharge state to the substantially discharged state within a predetermined time period after the programming operation.

38. The article of manufacture of claim 36 wherein the article of manufacture is a smart card.

39. The article of manufacture of claim 36 further comprising:
    coupling means for coupling the article of manufacture to a reading device or programming device.

40. The article of manufacture of claim 36 further comprising:
    time determining means for determining whether or not a predetermined time period has elapsed since the binary time cell was programmed.--

Signed and Sealed this

Eighteenth Day of October, 2005

JON W. DUDAS
Director of the United States Patent and Trademark Office